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### NAVY AWARDS "E" PENNANT

Each year the Navy Department grants an "E" for excellence in gunnery to the ship making the highest record in marksmanship. The "E" pennant flying from the masthead is one of the most prized awards in the Navy.

On February 21 the "E" pennant was presented to the National Bureau of Standards for its "straight shooting" at problems presented to it by the Bureau of Ordnance, U. S. Navy Department. The ceremony took place around a new flag staff on the Bureau's grounds near the main entrance. Good weather, a sailors' guard, and music by the Navy Band helped to make the occasion a comp'ete success.

E. C. Crittenden, Assistant Director of the Bureau, introduced Rear Admiral Pettengill, Commandant of the Washington Navy Yard, who presented the pennant to Dr. Lyman J. Briggs, Director. The "E" pennant, together with the pennant of the Ordnance Bureau, was hoisted by two seamen in the presence of Hon. Jesse H. Jones, Secretary of Commerce, and members of the staff of the National Bureau of Standards. Short addresses were made by Rear Admiral Pettengill, Secretary Jones, and Doctor Briggs.

An "E" lapel button or pin has been awarded by the Navy to all members of the "crew" of the Bureau of Standards, each of whom, although perhaps not directly engaged in "firing the guns," nevertheless helped to make the enviable record possible. The first of these was presented during the ceremony to David E. Thomas, chief of the Office Division, who has the longest service record (39 years) of any member now "on board."

### STRUCTURAL PROTECTION AGAINST INCENDIARY BOMBS

The hazard from all types of incendiary bombs can be decreased by applying an incombustible covering over the attic or upper floor, assuming that this will act as a stopping layer for at least some of the bombs that may be used. While, without defining type and weight, nothing definite can be said relative to the penetration of these bombs, even the lighter ones would be expected to go through an ordinary wood-frame roof with the usual roof coverings and possibly also an attic or upper floor.

A covering applied to such floors would increase the resistance to penetration, besides affording protection against ignition by the bomb. The thickness to be applied need be limited only by practical considerations of cost and the weight that the construction can

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support. There will be progressive gain in safety with increase in thickness. A 1- to 1½-inch thickness of portland cement mortar or concrete, cast in place or as precast slabs, will prevent ignition of a wood floor from a bomb such as one of the kilogram thermite-magnesium type. Lesser thicknesses would give temporary protection, and the incombustible finish would assist materially in extinguishing or removing the bomb without ignition of the floor beneath.

Slabs made with cinders, slag, and other light-weight aggregates are somewhat more resistive than those made with sand and gravel, although the latter do not disintegrate appreciably under the heat of the bomb. Precast slabs may require a finish consisting of portland cement mortar or magnesite to give an even wearing surface. The wearing properties of portland cement mortar can be greatly increased by the addition of emulsified asphalt in the mix. The precast slabs should preferably have beveled edges to enable the mortar to fill the joints fully, and can be nailed in place through such joints. An alternative to nailing might be to bed them in mortar. Where the traffic is light and surfaces are fairly even, it might serve the purpose to fill the joints with mortar and apply a rubber-base concrete paint in lieu of other top finish.

Slabs of burnt clay are another possibility—a development that deserves the attention of the clay-products industries. Present stock sizes in solid or near solid units of thickness from 2 inches up might be used if other considerations permit.

Where the ceiling construction has no floor above, the most practical method would probably be to floor it over with boards (not necessarily matched) on which the covering is applied.

However, the bomb is likely to ignite any combustible contents near it. As protection, the side walls and roof rafters can be covered with boards made largely or wholly of incombustible materials, such as cement-asbestos boards or gypsum wallboards, or with plaster on metal or gypsum lath. Some degree of protection can also be obtained with heavy coats of sodium silicate, whitewash, borax paints, or other fire-retardant coatings applied with brush or spray. Spaces along the walls into the construction beneath should be blocked with the floor covering material or other incombustible fill.

Protections can also be applied on wood-frame flat roofs, but preferably should be not less than 3 or 4 inches thick to give the needed additional resistance to penetration required for a stopping layer in this location. The advantage within limits of using light-weight materials is apparent in decreasing the load on the structure and increasing heat insulation, particularly for ordinary temperature conditions. The protecting layer should be anchored into masonry or other exterior wall construction, and be waterproofed or otherwise covered to form a weather-tight covering. Sloping roofs require less thickness but introduce greater difficulties in application.

Between the stopping layer and any refuge room a floor equivalent in impact resistance to a single-board wood floor should intervene. This gives additional resistance to penetration and to impacts from falling materials in case of disruption of the construction under the stopping layer.

## STANDARDIZATION WORK OF TECHNICAL AND TRADE ORGANIZATIONS

"Standardization Activities of National Technical and Trade Organizations" is the title of a new publication (Miscellaneous M169) which has just been released.

This volume, which was compiled by Robert A. Martino of the Bureau's Codes and Specifications Division, presents what is believed to be a fairly adequate picture of the standardization and simplification movement as now carried on by national technical and trade organizations in the United States. It outlines the activities and accomplishments of 450 American societies and associations which consider standardization as one of their important activities, and devotes special attention to the cooperation of these groups among themselves, and with such general standardizing agencies as the American Standards Association, American Society for Testing Materials, Central Committee on Lumber Standards, and the National Aircraft Standards Committee.

During the present emergency, the information given in this publication should be particularly valuable as it makes available to each group a clear picture of what others are doing thus helping to avoid duplication. It provides the answers to many urgent inquiries received by the Bureau from manufacturers, industrial experts, engineers, and purchasing agents, and thus should be a means of furthering the defense program.

The various organizations are arranged alphabetically, and the name

and address of the secretary or other official to whom inquiries should be sent are given in all cases. A "Bibliography on Standardization" compiled by Anne L. Baden, of the Library of Congress, and a comprehensive index are valuable features.

Copies of M169, bound in buckram, are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 75 cents.

## EVALUATION OF PROCESSES FOR THE PRODUCTION OF RUBBER

The Bureau has outlined a procedure for evaluating the numerous plans which are being offered for the production of rubber in the present emergency. This procedure is essentially the same as that used by industry for determining the merit of any new process, and is equally applicable to proposals for growing, synthesizing, or reclaiming rubber.

According to this procedure, a potential investor, sponsor, or other party interested in finding out the commercial possibilities of a new process for obtaining rubber should take the following five steps:

1. An explicit, written description of the process should be obtained, together with a statement of the yield of rubber to be expected.

2. This description should be reviewed by a disinterested authority to determine whether or not it is consistent with known facts and accepted scientific principles.

3. If the process appears practical, it should be tested by having a competent laboratory repeat it independently of the inventor.

4. If the process yields rubber as claimed, samples should be tested to determine the quality and probable commercial value of the rubber.

5. If the foregoing laboratory tests are satisfactory, the process should be operated on several successively larger scales until a scale is reached in which the product is made in commercial quantities.

Decision as to whether or not a process is to be used in large-scale production should be reserved until all five of these steps have been passed successfully. This procedure will necessarily cost time and money and is quite at variance with the common notion that it is only necessary to test a small sample and, if satisfactory results are obtained, to proceed at once to start a plantation if the rubber is to be grown or to build a factory if it is to be made by synthesis or reclaiming. Actually, such a hasty procedure would be likely to prove disastrous to even the best of processes. Some of the reasons back of the five steps which have been laid down are discussed in the following paragraphs.

*Description of the process.*—An adequate, written description is a prime requisite for any intelligent consideration of a process. If a process is secret, or if it cannot be described so that it can be repeated without assistance from the inventor, it is not ready for use in production.

Many inventors have sought backing for secret processes by exhibiting samples, and often prospective investors have become so engrossed in testing samples as to lose sight of the fact that they have no evidence that the samples were produced as claimed. In order to meet objections on this score the promoters of secret processes sometimes arrange elaborate demonstrations in which a process can be witnessed without a disclosure being made. Numerous hoaxes have been perpetrated in connection with such demonstrations, and hundreds of pounds of rubber have been obtained from carefully sealed, locked, and watched containers with seemingly as much ease as a magician brings a rabbit from a hat. It cannot be too strongly emphasized that there is no way in which a secret process can be adequately evaluated.

A statement of the yield is an essential part of the disclosure of a process, inasmuch as many of the ways in which rubber can be obtained are not practical because the yield is too small. Thousands of plants, for example, contain small amounts of rubber, and hundreds have been tried at one time or another as sources of rubber, but only a very few yield enough to warrant their being considered for use in production.

*Review of the process.*—A critical review of proposed processes for obtaining rubber usually eliminates most of them from further consideration, either because they are not new or because they are not based on sound scientific principles. The production of a rubber-like material from a vegetable oil and sulfur, for example, is often heralded as a new discovery in spite of the fact that the product, factice, has been known for a hundred years and is a common article of commerce.

Sometimes the description of a process involves reactions or procedures which seem fantastic and highly improbable to the chemist, but appear plausible to the layman. In such cases it may be advisable to proceed with a test of the process, even though the chances that it will work are vanishingly small.

The claim is sometimes made that because a process has been patented it has been tried out and approved by the Government. Such, of course, is not the case, since a patent is designed simply to protect the inventor in his use of a process, but this does not testify to its practicability.

*Independent repetition of the process.*—Independent repetition of the process under consideration is a sure safeguard against fraudulent and unworkable claims, and also serves to determine whether or not the process has been adequately and completely described. This work should be undertaken by competent chemists, engineers, plant physiologists, or other technically trained investigators, as required by the nature of the process. They should follow written instructions furnished by the inventor, and should independently obtain and identify all materials used. Their work should give a definite answer to the question, "Does the process yield rubber, and if so, in what amount?"

*Testing of the rubber.*—If the independent trial of the process yields rubber in practical amounts, then, and only then, should serious consideration be given to testing the rubber to determine its quality and probable commercial value. Even at this stage the tests need not be highly critical, since the requirements of the industry are so wide and varied that many different rubberlike products can find profitable use.

*Development of process to commercial stage.*—If the rubber obtained on a laboratory scale is satisfactory both in quality and quantity, the process is still not ready for immediate large-scale use but must go through a development stage in which the production is expanded step by step. Many difficulties are likely to be encountered in production which were not even anticipated from laboratory work. Expansion by stages enables these difficulties to be found and corrected and also aids in determining costs and estimating the size of units required for the most efficient production.

This development procedure is equally necessary whether the rubber is to be collected wild from a hitherto unused plant, or grown on a plantation, or produced in a factory by synthesis or reclaiming. The processes which are now being pushed into large-scale production to meet the present emergency are not new and untried but have all been in the development stage for a number of years and have a background of successful commercial use.

## CALCIUM CARBONATE IN RUBBER

A study of the effect of fillers on the electrical properties of rubber is being made at the Bureau in order to arrive at general relations between the properties and proportion of filler and the dielectric constant, power factor, and conductivity of the compounded rubber. The results obtained with calcium carbonate are reported by Arnold H. Scott and Archibald T. McPherson in the Journal of Research for March (RP1457). The system rubber-calcium carbonate presents a relatively simple case for study, because the electrical properties of calcium carbonate do not differ as greatly from those of rubber as do the properties of many other fillers.

The experimental compounds used in this investigation were prepared by incorporating reagent-quality calcium carbonate into two simple base compounds; one consisted only of Vistanex, a synthetic rubber-like hydrocarbon, which was employed without vulcanization; the other was made from natural rubber and was vulcanized by means of tetramethylthiuram disulfide. The calcium carbonate was used in proportions up to about 50 percent by volume.

It was found possible to express the relation between the dielectric constant and the volume fraction of calcium carbonate by the general relation,

$$\frac{K-K_1}{K+FK_1}=V_2\frac{K_2-K_1}{K_2+FK_1},$$

where $F$ is a constant having the value 2.7; $K$, $K_1$ and $K_2$ are the dielectric constants of the mixture, the base compound, and the calcium carbonate, respectively; and $V_2$ is the volume fraction of the calcium carbonate. At a frequency of 1,000 cycles per second and a temperature of about 25° C. the natural rubber base compound has a dielectric constant 2.52, the Vistanex, 2.29, and the calcium carbonate, 8.75. The power factor and the conductivity increase with increasing percentages of calcium carbonate, but do not seem to bear any simple relation to the composition.

## BEATER PRACTICE IN MANUFACTURING OFFSET PAPERS

The manufacture of paper for high-quality color printing by modern offset lithography, a type of paper that is of particular interest at this time because it is used in the production of army maps, is being studied at the Bureau by Charles G. Weber, Merle B. Shaw,

M. N. Geib, and Martin J. O'Leary. The expansion, curling, and buckling of paper occurring because of changes in moisture content during printing, often impair the quality of the finished product and cause a loss of production through the misregister of successive color prints. Information obtained at the Bureau has made possible important improvements in methods of treating and handling papers to reduce variations in moisture content. The latest information on this subject, as set forth in the Journal of Research for March (RP1455), relates to control in the manufacture of papers that will minimize the effects of moisture changes.

A series of papers was made in the Bureau's mill from the various commercial wood pulps commonly used in lithographic papers. Variations in the mechanical beating of the fibers were controlled, while other factors were held constant. These papers were tested in the Bureau's laboratory and printed experimentally at the U. S. Coast and Geodetic Survey.

The data indicate that for best results in multicolor printing, the papers should be made with the minimum of beating necessary to obtain the required formation and finish. Some of the adverse effects of excessive beating that cause difficulties are high expansivity, curling and buckling, low opacity, and a low rate of absorption of the oil vehicle of the ink. The admixture of a filler pulp with a strong pulp such as sulfite lessens the adverse effects of beating, and assists in obtaining suitable formation and finish. The best all-around results were obtained with sulfite-soda and sulfate-soda mixtures. Deinked book stock had excellent opacity, but papers containing appreciable amounts of it curled excessively.

## COMMERCIAL STANDARD FOR DRIVING AND PASSING LAMPS

Electric supplementary driving and passing lamps for vehicles (after market), is the subject of Commercial Standard CS97–42, which has just been made available in printed form.

This voluntary standard of the trade records tests for light distribution, vibration and shock, corrosion, penetration of moisture and dust, as well as color limits for the lens, and the approved plan for marking and labeling.

The chief purpose of the standard is to provide a foundation for the voluntary certification and labeling of these devices so that the purchaser can select supplementary driving lamps or passing lamps which comply with the standard. It covers chiefly those supplementary driving and passing lamps which are added to the vehicle by the user, and does not include genuine replacements of original equipment.

The regular labeling of items which have been tested and found to comply with the standard should result in a material improvement in quality, increased safety on the road and, in due course, greater uniformity in State and National regulations. The standard became effective for new production on January 8, 1942.

Copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 5 cents.

## TENSILE ELASTIC PROPERTIES OF METALS

Sensitive tension tests made by Dunlap J. McAdam, Jr., and Russel W. Mebs of the Bureau's Metallurgy Division, upon specimens of nickel, copper, open-hearth iron, and typical steels, have led to the identification of several basic factors which influence the variation of the elastic properties of metals during plastic extension. These factors are (*a*) the "macroscopic" and "microstructural" internal stresses; (*b*) the work-hardening rate, which probably is directly associated with the permanent crystal lattice expansion of the metal occurring during deformation; and (*c*) the orientation of the metal crystal lattice.

As explained in the March Journal of Research (RP1459), the elastic properties measured were the "proof stresses," the modulus of elasticity, and the variation of the modulus with stress. The "proof stresses," i. e., stresses producing specified amounts of permanent deformation, were derived from curves of the variation of stress with permanent extension or set. The modulus of elasticity and its variation with stress were derived from curves of variation of stress with elastic deformation or strain. Diagrams are given showing the variation of the proof stresses and elastic indices with prior plastic extension.

A study of these diagrams and a survey of the literature permitted the identification of these basic factors. A fairly complete survey and discussion is given of the literature dealing with (*a*) crystal reorientation produced by plastic deformation and annealing, and (*b*) the various types of internal stress. Diagrams showing the directional variation of the tension and shear moduli and the "elastic limit" for single crystals of various metals are reproduced.

## SOIL-CORROSION STUDIES, 1939

During the course of the soil-corrosion investigation, begun by the Bureau in 1922, specimens of various materials suggested for possible use underground have been inspected at regular intervals and the condition of the specimens set forth in a series of progress reports. Positive conclusions concerning the performance of the various materials are not drawn until the expiration of the exposure period for any material. Nevertheless, tentative comparisons have been made of the corrosion resistance of different materials after relatively short exposures. Significant trends in the data have thus been brought to light and may be considered in the selection and development of materials for service underground.

In the latest progress report on the soil-corrosion investigation, which will appear as RP1460 in the Journal of Research for March, K. H. Logan presents data on the corrosion of a wide variety of ferrous metals and alloys, including both cast and wrought materials, and nonferrous metals and alloys, which have been exposed to soil corrosion under different environmental conditions. Certain classes of materials have been exposed for 2 years only, others for as long as 17 years. Among the specimens for which data are reported are fourteen alloy irons and steels which contain small amounts of chromium, nickel, and copper. While there is some evidence for the beneficial effect of nickel in low-alloy steels, chromium in amounts up to 4 to 6 percent did not reduce the rate of maximum penetration for the particular exposure periods.

A fairly definite relation between corrosion and the zinc content of a series of brasses exposed 7 years applies to most of the soil conditions included in the tests. However, for an organic soil containing sulfides this relation was reversed.

Both lead and zinc are corroded in soils, but not usually by the same soil conditions. Zinc is corroded usually in the same soils that are corrosive to ferrous metals. In these same environments the corrosion rate of lead may be very low.

## SOIL-CORROSION CONFERENCE

The Bureau is planning to hold a fifth conference on underground corrosion some time late in 1942. One of the requirements of the conference will be that each person participating shall submit a paper dealing with some phase of underground corrosion or its mitigation.

Papers need not necessarily be suitable for publication, nor is it necessary that they contain a solution for the problem presented; they may be long or short, but they should set forth the definite ideas of the contributor. As in the past, papers should be completed at least 1 month in advance to permit their exchange before the conference so that when the meeting takes place the delegates will be prepared to discuss them.

Those interested in the proposed conference should communicate with Kirk H. Logan, Chief of the Underground Corrosion Section, National Bureau of Standards, Washington, D. C.

## ANALYSIS OF RARE EARTHS

Attempts to analyze materials composed essentially of the rare earths have not been particularly successful because these elements are so nearly identical in their chemical and physical properties. Many of them, however, form salts which give rise to characteristic absorption bands when their solutions are observed by means of a spectroscope. Advantage has been taken of this property for determining these elements without having to effect their actual chemical separation.

The transmittancies of solutions of the nitrates of dysprosium, holmium, erbium, thulium, and ytterbium have recently been measured by Clement J. Rodden of the Bureau's Chemistry Division, both as a function of wavelength, in the range 350 mμ to 1,000 mμ, and as a function of concentration. Terbium and yttrium show no appreciable absorption in this spectral range. The absorption band found to be most suitable for the determination of dysprosium is at 910 mμ; for holmium, 643 mμ; for erbium the bands at 521 mμ and 653 mμ; for thulium 684 mμ; and for ytterbium the bands at 950 mμ and 973 mμ.

The measurements obtained are reported in RP1456 in the March number of the Journal of Research, together with illustrations of their application to the analysis of mixtures of the yttrium group of rare-earth elements.

## TEMPERATURE ESTIMATES OF THE PLANET MARS

In earlier publications (Scientific Papers S512 and S553) data were given on the planetary radiation emanating from different parts of the surface of the planet Mars as measured by W. W. Coblentz, chief of the Bureau's Radiometry Section, with a thermocouple and filters mounted on the reflecting tele-

scope of the Lowell Observatory at Flagstaff, Ariz. From these radiometric measurements, planetary temperatures were calculated by five methods, using the transmission data of the earth's atmosphere at 7 to 15$\mu$ published by Fowle in the Smithsonian Physical Tables. In the meantime, based upon observations at Flagstaff (elevation 7,250 ft), Adel and Lampland have published atmospheric transmissions that appear to be somewhat different from the Smithsonian measurements in the spectral band extending from 7 to 15 $\mu$.

Since the planetary radiation measurements were made at Flagstaff, Doctor Coblentz has recalculated the data obtained during the oppositions of Mars in 1924 and in 1926, using the atmospheric transmission observed at that station. In the Journal of Research for March (RP1458), he reviews the five methods and procedures previously used by three calculators in deriving planetary temperatures, and shows that in four of these methods of calculation, which employ the law of total radiation of a black body, there is but little difference in the planetary temperatures deduced by using the transmission coefficients of the earth's atmosphere published by these two observatories. This is owing to the fortuitous circumstance that, while they differ in spectral outline, the total areas encompassed by these two transmission curves, and hence, the calculated total amounts of planetary radiation transmitted by the earth's atmosphere are nearly equal. Therefore, no revision is made of the planetary temperatures previously deduced by four methods, involving the law of total radiation.

On the other hand, the fifth method, using the law of spectral radiation of a black body and the Flagstaff transmission coefficients of the atmosphere, gives planetary temperatures that are entirely different from the values previously deduced by this and by the other four methods using the Smithsonian data. This inconsistency can be eliminated, at least in part, and the data harmonized by taking into consideration selective emission of the planetary surface.

On the assumption that the surface of Mars, like the Earth, is composed of silicates (feldspar, mica, silica, etc.) which have a high selective emission at 8 to 10 $\mu$, the temperatures derived from the spectral components of planetary radiation of Mars, measured in 1926, are in good agreement with the values calculated by other methods which are less affected by selective spectral emission. From this it would appear that, assuming the temperatures deduced by the other methods of calculation are indicative of meteorological conditions at the time of making the observations, the fluorite filter method of analysis may be a useful means of securing information on the selective spectral emission of the planetary surface.

In a supplementary note, a new thermocouple of bismuth and chromel-P wires, suitable for planetary radiometry, is described.

## NEW AND REVISED PUBLICATIONS ISSUED DURING FEBRUARY 1942

### Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 28, number 1, January 1942 (RP1444 to RP1448, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Journal of Research of the National Bureau of Standards, volume 28, number 2, February 1942 (RP1449 to RP1454, inclusive). Price 30 cents.

### Research Papers [2]

RP1433. Nature of the resistance of wool to digestion by enzymes. Walton B. Geiger, Wilbur I. Patterson, Louis R. Mizell, and Milton Harris. Price 10 cents.

### Simplified Practice Recommendations [2]

R3–41. Metal lath (expanded and sheet). (Supersedes R3–36). Price 5 cents.

### Commercial Standards [2]

CS97–42. Electric supplementary driving and passing lamps for vehicles (after market). Price 5 cents.

### Miscellaneous Publications [2]

M169. Standardization activities of national technical and trade organizations. Robert A. Martino. Price 75 cents (buckram).

M170. Report of the thirty-first national conference on weights and measures attended by representatives from various States, sponsored by the Na-

[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, $3.50 per year (to addresses in the United States and its possessions and to countries extending the franking privilege; other countries, 70 cents and $4.50, respectively).

tional Bureau of Standards, Washington, D. C., June 3–6, 1941. Price 35 cents.

Technical News Bulletin [2]

Techincal News Bulletin 298, February 1942. Price 5 cents. Annual subscription, 50 cents.

## MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC674. Railway track scale testing service of the National Bureau of Standards, fiscal year 1941 (July 1, 1940 to June 30, 1941).

LC676. List of commercial standards. (Supersedes LC669.)

LC677. Electrical characteristics of dry cells and batteries.

LC678. Luminous and fluorescent paints.

## RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS [3]

Thermal expansion of cast and swaged chromium. Peter Hidnert. Metals and Alloys (330 West 42d St., New York, N. Y.) **14**, 792 (November 1941).

Protection of personnel handling radium. L. F. Curtiss. ASTM Bul. (Am. Soc. Testing Materials, 260 So. Broad St., Philadelphia, Pa.) No. 114, 21 (January 1942).

Material shortages—redesign and substitution. Herbert L. Whittemore. Engineering News-Record (330 West 42d St., New York, N. Y.) **128**, No. 3, 114 (January 15, 1942).

Development of methods for the evaluation of textile finishes. Edwin C. Dreby. ASTM Bul. No. 114, 15 (January 1942).

The technical cohesive strength and yield strength of metals. D. J. McAdam, Jr. Am. Inst. Mining and Metallurgical Engineers (29 West 39th St., New York, N. Y.), Tech. Pub. 1414 (January 1942).

Comparison of sonic and other measurements of mortar bars exposed to sulfate solutions. F. B. Hornibrook. ASTM Bul. No. 113, 25 (December 1941).

Relation between air and water permeabilities of building brick. R. T. Stull and Paul V. Johnson. Bul. Am. Ceramic Soc. (2525 No. High St., Columbus, Ohio) **20**, No. 12, 443 (December 1941).

Research laboratories are a necessity, not a luxury. Lyman J. Briggs. Instruments (1117 Wolfendale St., Pittsburgh, Pa.) **15**, No. 1, 3 (January 1942).

[2] See footnote on preceding page.

[3] These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

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